Supporting Data for the SFLO 2002 Legislative Report

History

The Small Forest Landowner Office was established through the Salmon Recovery Act, 1999 Laws Sp. Sess. Ch. 4 and codified into law in RCW 76.13. The following excerpt from RCW 76.13.110 describes the duties of the office:

RCW 76.13.110 Small forest landowner office--Establishment--Duties--Advisory committee--Report to the legislature.

(1) The department of natural resources shall establish and maintain a small forest landowner office. The small forest landowner office shall be a resource and focal point for small forest landowner concerns and policies, and shall have significant expertise regarding the management of small forest holdings, governmental programs applicable to such holdings, and the forestry riparian easement program.

(2) The small forest landowner office shall administer the provisions of the forestry riparian easement program created under RCW 76.13.120. With respect to that program, the office shall have the authority to contract with private consultants that the office finds qualified to perform timber cruises of forestry riparian easements or to lay out streamside buffers and comply with other forest and fish regulatory requirements related to the forest riparian easement program.

(3) The small forest landowner office shall assist in the development of small landowner options through alternate management plans or alternate harvest restrictions appropriate to small landowners. The small forest landowner office shall develop criteria to be adopted by the forest practices board in rules and a manual for alternate management plans or alternate harvest restrictions. These alternate plans or alternate harvest restrictions shall meet riparian functions while requiring less costly regulatory prescriptions. At the landowner's option, alternate plans or alternate harvest restrictions may be used to further meet riparian functions. The small forest landowner office shall evaluate the cumulative impact of such alternate management plans or alternate harvest restrictions on essential riparian functions at the sub-basin or watershed level. The small forest landowner office shall adjust future alternate management plans or alternate harvest restrictions in a manner that will minimize the negative impacts on essential riparian functions within a sub-basin or watershed.

(4) An advisory committee is established to assist the small forest landowner office in developing policy and recommending rules to the forest practices board. The advisory committee shall consist of seven members, including a representative from the department of ecology, the department of fish and wildlife, and a tribal representative. Four additional committee members shall be small forest landowners who shall be appointed by the commissioner of public lands from a list of candidates submitted by the board of directors of the Washington farm forestry association or its successor organization. The association shall submit more than one candidate for each position. Appointees shall serve for a term of four years. The small forest landowner office shall review draft rules or rule concepts with the committee prior to recommending such rules to the forest practices board. The office shall reimburse nongovernmental committee members for reasonable expenses associated with attending committee meetings as provided in RCW 43.03.050 and 43.03.060.

Executive Summary

In 2001 the Small Forest Landowner Office embarked on the first effort in Washington State to systematically collect comprehensive and detailed statewide demographics on all small forest landowners and the land base they manage. This information was then organized in a database that could be queried on multiple parameters. The Office began developing this database by first collecting tabular (non-digital) tax parcel records from each county for parcels ranging from 5-5,000 acres that were enrolled in a forest use tax classification. Initial analysis of **statewide tax parcel records revealed approximately 22,000 small forest landowners who represented over 1.6 million acres of forestlands enrolled in forest-use tax classifications.** The Office then analyzed digital orthophotos (aerial photos) to determine how many additional forested parcels ranging from 5-5,000 acres existed that were *not* enrolled in any type of a forest-use tax classification. After omitting government and industrial ownerships, **these latter parcels revealed a range of between 16,026 – 106,340 *additional* landowners owning an *additional* 176,940 – 1,801,579 acres of forested parcels between 5 and 5,000 acres in *non-timber* tax classifications.** Geographic Information System (GIS) analysis was conducted on sample areas of the state and indicated the majority of small forestlands tend to occur at lower elevations, on highly productive soils, near streams and on the periphery of urbanizing areas.

Tabular tax parcel records do not provide high resolution spatial data as the only geographic references provided with this data is township, section and range. Utilizing non-digital county tax parcel records in the development of this database revealed the need for a statewide digitized GIS database of small forestlands that can provide spatially explicit, or high resolution geographic data on this land base. County tabular tax parcel records do not provide high enough resolution data to show proximal locations to water types, accurate estimations of ownerships within watersheds or patterns of contiguousness. In short, several of the questions posed by the state legislature could not be answered in their entirety due to the limitations of tabular tax parcel data. Appendix B shows a comparison between the results of tabular data versus GIS data when trying to ask questions that require analysis of highly accurate geographic information.

In order to adequately understand the future effects of natural resource management policies, particularly on smaller ownerships, policy makers must have access to geographically accurate data on the land base and landowners that are being served. Such information is critical for the Department of Natural Resources (Department) and other state natural resource agencies who wish to target and track the effectiveness of policies and incentives that aim to conserve small forested woodlots and the public benefits they provide. A spatially explicit database is also essential to provide the information on riparian ownerships that will be necessary for gaining federal assurances for small forest landowners who manage their timber according to the Forests and Fish rules. Accurate geographic information provided by a spatially explicit database will also allow the Small Forest Landowner Office to help landowners meet their Road Maintenance and Abandonment Plan requirements. A statewide GIS database will allow the Office to identify and prioritize fish blocking culverts and coordinate the timely and

effective repairs necessary for restoring fish passage across all small forestlands. A statewide GIS database will also help the Office assess the health of aquatic and terrestrial wildlife habitats, track the spread of pests and diseases and provide information critical to managing wildfires in landscapes with many small fragmented ownerships.

A geographically referenced database will also allow policy makers to track trends in small forest ownerships across time. Such a database would allow highly detailed analysis of such trends as:

- Conversion of small forested woodlots to non-forest use
- Geographic distribution of specific subsets of family forestlands (i.e. 5-20 acre parcels, 21-100 acre parcels, etc.)
- Adjacency of family forestlands to fish-bearing streams and cumulative effects analysis of the impacts of forest management on aquatic resources
- The environmental, economic and social values small forestlands provide
- Effectiveness of policies and incentive programs

Many challenges face small forest landowners in their efforts to keep their lands economically viable. Timber markets are highly volatile and have been declining in value in recent years due in part to the globalization and consolidation of the timber industry and the lack of manufacturing capacity for medium to large diameter logs. A growing real estate market and a projected doubling of our state's population have made conversion a lucrative option for small forest landowners who can no longer afford to manage their lands as forests. Increasing environmental regulations have also decreased landowners' ability to harvest merchantable timber, particularly those near streams and waterways.

The Small Business Economic Impact Statement (SBEIS) developed for the Forests and Fish Report (FFR) estimated that implementation of the new forest practices rules would reduce the economic viability of small forest landowners by 25.2 percent on the westside and 32.0 percent on the eastside of the state (Washington Forest Practices Board 2001). It should be noted that the SBEIS used the "old" stream typing system of 1-5 and 9 to assess financial impacts to landowners with water on their property. A new stream typing system is being developed which will consider stream habitat that has the potential to be utilized by all fish species during all life stages. This latter definition will significantly increase the number of waterways requiring buffers. Therefore, the financial impacts estimated by the SBEIS are considered conservative. Over the past two years of implementation of the Forests and Fish rules, higher impacts to small forest landowners have been shown. Statistics generated from landowners with riparian holdings who have enrolled in the Forestry Riparian Easement Program, for example, show an average impact of 75 percent. 13 out of the 34 landowners currently enrolled have had 100 percent of the timber in the proposed harvest unit impacted by the new rules. Data from a recent Department of Revenue report to the state legislature (Reeves 2002) indicates the ratio of the value of timber required to be left unharvested under the new rule versus the value of the Salmon Tax Credit was 11 to 1 for industrial landowners and 23 to 1 for small forest landowners.

Successful implementation of the Forests and Fish rule package will depend on the ability of policy makers to ensure the alternate planning process and the Forestry Riparian Easement Program is successful for small forest landowners. The statewide survey of small forest landowners conducted for this report indicates that more than 75% of those surveyed have little or no knowledge of the Forests and Fish rule package. Unintended consequences, such as the landowner dissent that arose from the implementation of the Road Maintenance and Abandonment Plan requirements, are likely to reoccur as more small forest landowners become familiar with the operational restrictions imposed by the new rules. Outreach and incentive programs are therefore essential for the successful implementation of the Forests and Fish rule package.

Small forestlands provide a wide variety of local, national, and global services, including carbon sequestration, biodiversity conservation, recreation, and watershed protection. Approximately 90 percent of endangered species rely on privately held forestlands for some of their habitat needs (National Academy of Science 1998). These benefits, however, do not provide direct financial returns to the forest landowner, who often lacks both the incentives and the funds to maintain these services. Timber harvested from small woodlots constitutes over 29% of all timber harvested in the state (Larsen 2000). Therefore, these small-scale woodlots also make significant contributions to both local and state economies.

The Legislature has acknowledged the important role small forestlands play in providing public resources by establishing the Small Forest Landowner Office and its programs. The Department is committed to the protection of public natural resources while ensuring the economic viability of the timber industry, including small forest landowners. The Department fully supports the legislative direction provided for small forest landowners and is working hard towards the successful implementation of the Forests and Fish rule package.

Washington State's Small Forest Landowners

Background

Small forestlands represent the single largest ownership of productive forestland in the United States. The extent and value of this ownership is generally not well understood by the public or by state or federal natural resource agencies. Across the nation, small forested woodlots represent 59% of the available forestland (Birch 1996). It is estimated that approximately 90% of currently listed endangered species depend on private forestland for some of their habitat needs (National Academy of Science 1998).

Small-forested woodlots are ecologically significant. They also have an importance to communities and ecosystems that extends far beyond their acreage alone. Small forestlands tend to be located at low elevations on highly productive soils (including many biologically important lowland riparian and wetland areas). Small forestlands are often the interface between urbanizing population centers and middle and higher elevations where federal, state, and industrial forestlands are found. In many cases these forests constitute the "buffer" between local communities and the large tracts of industrial forestlands, and thereby minimize the contrasts between urban settings and large-scale forest management practices. Many of these forest owners represent multi-generational families within the community and are an important part of the region's culture. These families support local schools and civic organizations, and the revenue from tree farming families represents real income; *i.e.*, goods are produced from a renewable natural resource to provide a value-added commodity. These profits stay in the community, promoting long-term economic viability and community health.

Historically, risks affecting small forest landowners consisted primarily of fluctuating markets and the impacts of natural disasters such as fire and drought. Recently, forestland owners have encountered increasing forest practice regulations and increasing pressures to convert their lands to non-forest use. Changing regulatory constraints can result in economic hardships for small forest landowners and cloud the future for new investments in small-scale forestry. Planting a tree is, at a minimum, a 50-year investment and a changing regulatory climate increases the investor's risk. Such regulatory uncertainty, in the face of rapidly rising real estate values, has caused many small forest landowners to question keeping their lands in forest use. From 1987 to 1997, 56 square miles per year (100 acres per day) of non-industrial private forestlands in Washington State were converted to residential and commercial uses (WA Department of Natural Resources 1998).

Conversion of small forestlands to other uses will continue to occur for a variety of reasons. One of the driving forces contributing to this conversion is the growing population of Washington State, which is expected to nearly double in the next 40 years (Washington State Office of Financial Management 2002). Some small forest landowners have invested in timberland anticipating they will convert the land to non-forest use at some point in the future. At the current estimated rate of conversion the state will lose approximately 500,000 acres of non-industrial private forestland within the next 10 years - most of it in low elevation, highly productive areas of the state. To help

natural resource policy makers focus their efforts on creating incentives for small forest landowners, geographically accurate, or spatially explicit, demographic information on this land base will be essential. Spatially explicit data will allow decision-makers to analyze the effectiveness of policies and incentives by directly observing trends in conversion, fragmentation and habitat quality on small forestlands across the state. With limited time to conserve areas critical to the habitat of endangered species, it is essential that natural resource policy makers have the tools necessary to focus their efforts in areas that will maximize benefits.

Washington State Small Forest Landowner Demographics

Introduction

The Salmon Recovery Act 1999 LAWS SP. SESS. CH. 4, codified into law as RCW 76.13.110, outlines the provisions under which the department of natural resources shall establish and maintain a Small Forest Landowner Office and provides statutory direction for the Office. RCW 76.13.110 subsections (5)(a) through (5)(d) direct the Small Forest Landowner Office to collect demographic information on small forest landowners and provide, by December 1st, 2002, "a report to the board and the legislature containing:

> *(a) Estimates of the amounts of non-industrial forests and woodlands in holdings of twenty acres or less, twenty-one to one hundred acres, one hundred to one thousand acres, and one thousand to five thousand acres, in western Washington and eastern Washington, and the number of persons having total non-industrial forest and woodland holdings in those size ranges;*
> *(b) Estimates of the number of parcels of non-industrial forests and woodlands held in contiguous ownerships of twenty acres or less, and the percentages of those parcels containing improvements used: (i) As primary residences for half or more of most years; (ii) as vacation homes or other temporary residences for less than half of most years; and (iii) for other uses;*
> *(c) The watershed administrative units in which significant portions of the riparian areas or total land area are non-industrial forests and woodlands;*
> *(d) Estimates of the number of forest practices applications and notifications filed per year for forest road construction, silvicultural activities to enhance timber growth, timber harvest not associated with conversion to non-forest land uses, with estimates of the number of acres of non-industrial forests and woodlands on which forest practices are conducted under those applications and notifications.*

Essential to collecting demographics on non-industrial forest and woodland holdings is determining what definition should be used to describe these ownerships. Historically, there have been five definitions used for this purpose.

In 1978 the Washington State Department of Natural Resources published *A Profile of Western Washington's Non-industrial Forest Landowners* (Koss 1978). In this report, non-industrial private forest landowners were defined as those landowners not affiliated with a processing plant. Under this definition, partnerships and corporations were included unless their primary concern with timber production would obviously put them in the "forest industry" group. This study identified approximately 2.3 million acres of non-industrial private forestland in ownerships of 20 acres or greater. The authors of this report concluded there were approximately 31,540 non-industrial private forest landowners in Washington who owned parcels averaging 175 acres in size.

The United States Forest Service defines small forest landowners as farmers and miscellaneous owners of forestland (land capable of producing at least 20 cubic meters of annual growth per hectare) that is not owned by the forest industry (landowners associated with a primary manufacturing facility). In a 1994 report, the Forest Service

identified approximately 57,400 landowners who owned forested parcels between 10 – 5,000 acres totaling just over 3.3 million acres statewide (Birch 1994a). In a report published in 1997, the Forest Service identified a total of 3.0 million acres of non-industrial private forestland in Washington State using the same definition (Bolsinger 1997).

The Washington State Department of Revenue (DOR) collects records on all timber harvested in the state. On their timber harvest questionnaire landowners are asked to identify themselves as either forest industry, private large or private small. The latter two categories refer to non-industrial private forest landowners who do not operate a primary wood manufacturing facility and who have statewide holdings totaling 1,000 acres or more, or 1,000 acres or less respectively (Larsen 2000). It is not possible to generate total statewide acres or landowner numbers from DOR records as DOR only keeps track of landowners who harvest timber and report their harvest activities.

The Washington Department of Natural Resources Forest Stewardship program defines non-industrial forests and woodlands as suburban acreages or rural lands supporting or capable of supporting trees or other flora and fauna associated with a forest ecosystem, comprised of total individual land ownerships of less than 5,000 acres and not directly associated with wood processing or handling facilities (RCW 76.13.100(5)).

Finally, a harvest-based definition for small forest landowners was created in the Salmon Recovery Act, which defines small forest landowners as those who harvest less than two million board feet on an annual basis (RCW 76.13.120(2)(c)). While a harvest-based definition is useful from a regulatory standpoint (i.e. determining whether an individual landowner is harvesting above or below or certain volume of timber), the DOR database, which tracks harvest levels on all private forestlands, *only* collects harvest information (board feet and volume) and cannot be used to generate either total statewide numbers of acres or numbers of landowners.

All five definitions prove problematic when attempting to develop comprehensive demographic information from county tax parcel databases as none of the definitions match the codes county assessors use to classify land uses. Additionally, there is no statewide consistency in the methods county assessors use to classify land uses. **A statewide effort to standardize land use classifications would dramatically improve the state's ability to generate future reports on land use trends.**

Overview of data collection process for the Small Forest Landowner Office database

In early 2001, the Small Forest Landowner Office embarked on a three-fold process to collect demographic information on Washington State's small forest landowners and address the questions posed by the state legislature. These three processes were, 1) to collect tax-parcel data from each of the 35 timbered counties in Washington, as well as Geographic Information System (GIS) referenced tax parcel data from four sample counties; 2) to validate the tabular data using GIS information in combination with analysis of digital orthophotos from the four sample counties; 3) to conduct a statewide survey of 1800 small forest landowners. Following are brief descriptions of each of these processes.

County Tabular and GIS Tax Parcel Data Collection

For the purposes of the Small Forest Landowner Database, the Small Forest Landowner Office is using two primary data sets in its analysis: a 35 county tabular tax parcel dataset and GIS tax parcel dataset derived from four sample counties. Each of the counties approached by the Small Forest Landowner Office was asked for tax parcel information on parcels classified as forest, designated forest, open space timber, timberlands or any forestry related activity on parcels that ranged from 5-5000 acres. For these forested parcels the Office asked for acres, residence information, the landowner's name and address, the legal description (including township, section and range), the site address and the date the parcel record was last updated. In order to obtain this information, the office entered into data-sharing agreements with most counties that specifically limited the use of the data beyond the needs of this report.

All counties in Washington maintain a tabular tax parcel database. However, only 15 counties maintain some form of a GIS tax parcel database. The Office first collected the tabular tax parcel data from each of the 35 timbered counties in the state and combined this information into one master tabular database. The Office then collected GIS tax parcel data from four sample counties in the state (Clark, King, Stevens and Spokane) in order to compare the datasets and validate the accuracy of the tabular tax parcel databases. It is interesting to note that the two Western counties also contain five of the largest ten cities in Washington (OFM, 2001). Detailed analysis around these urban centers should provide a good baseline for monitoring conversion trends in the future. It should also be noted that GIS data was collected only on forested parcels occurring outside the urban growth boundaries of each county. Generally, most forested parcels occurring within the urban growth boundaries are smaller than five acres or are already subdivided and awaiting development.

Since the tabular database spatial information is based on legal descriptions, the resolution of the spatial component of the database is limited to one quarter of a section (160 acres) at best. Due to the high resolution, GIS data can provide much more accurate analysis of land holdings than tabular data. Therefore, GIS data from the four sample counties was used to answer questions pertaining to contiguousness and watershed and riparian ownerships. Additionally, by comparing tabular results to GIS results when analyzing forest-use tax designated parcels, the Office expected to generate a general

expansion factor that could be applied to the tabular tax parcel information from each of the counties that do not maintain GIS databases. This expansion factor could then be used to arrive at a more accurate statewide number of small forested acres for parcels in a forest use tax designation. However, comparisons of the tabular and GIS databases from the four sample counties revealed variations between the datasets that exceeded statistical bounds. Therefore, it was concluded that the tabular forest tax databases from each of the 35 timbered counties in the state would be used to generate valid statistics on parcels in a forest-use tax designation and no attempt to extrapolate from the tabular dataset to capture small forest landowner timber holdings in non-forest tax classifications was undertaken.

The objectives of the GIS validation were as follows:

- Determine the percentage of non-industrial forest parcels and landowners that were identified using county tabular parcel data versus county GIS data,

- Analyze the differences between parcel and landowner data using tabular data verses GIS data,
- Develop an expansion factor that could be applied to tabular tax parcel information from counties without GIS tax parcel databases,
- Determine whether tabular data can be used to effectively generate accurate reports,
- Explore issues such as contiguousness, significant riparian ownership by watershed, and acreages.

The data the Office received came in varying levels of quality, completeness and consistency. Of the information requested, the most common missing data needed to fulfill the requirements for this Legislative Report was residence information. Only two counties kept track of residence status. Other counties however kept track of improvements on the land. After discussions with county assessors it was recognized that improvements on the land could be a surrogate for residence information, and in the opinion of most county assessors those improvements were most likely primary residences, not vacation homes.

Validation of tabular and GIS tax parcel data using digital orthophotos

Given that both tabular and GIS tax parcel databases only identify those landowners who have enrolled their parcels in a forest use tax classification, the Small Forest Landowner Office conducted a validation study by digitizing Department of Natural Resources orthophotos from 1994 – 1996 for the four sample counties in order to identify non-industrial forested parcels that were not in a forest use tax classification. Once digitized, forestland in each county was converted to ArcINFO Coverages in order to make it compatible with the GIS tax parcel database in each county. GIS parcel information was overlaid on the digitized orthophotos and all parcels in a forest use tax classification or

classified as either industrial or government owned were eliminated. The remaining forested parcels could then be identified and their associated tax classifications analyzed. The results of the orthophoto analysis revealed a surprisingly large number of forested parcels ranging from 5-5000 acres in each county that were not identified by either the tabular or GIS tax parcel databases.

Small Forest Landowner Statewide Survey

In early 2002 the Small Forest Landowner Office, in partnership with the Washington State University Social and Economic Sciences Research Center, developed and mailed a comprehensive survey to 1800 small forest landowners state wide. The survey asked questions about landowners and their landholdings, timber harvest activities, the Forests and Fish Rules, Riparian areas and government assistance to landowners. The office received over 900 responses.

Appendix A

Results of GIS analysis of small forestlands in four sample counties

Clark County

After comparing the digitized orthophotos with the tax parcel data for Clark County, an additional 33,623 acres of non-industrial private forestland comprised of parcels ranging from 5-5,000 acres were identified that did not appear in the original tax parcel data received from the assessor's office. However, after analyzing the tax classifications of these additional parcels, two prominent forest-use classifications were discovered in the data that had not been included in the original data received from Clark County. These tax designations were "forestry operations" and unused land timbered". It was concluded that the most likely potential additional small forestlands would occur within these two designations. Therefore, an additional 8,659 acres, 939 parcels and 710 owners were identified in Clark County that were not originally captured by the original tax parcel data analysis.

Table 5. Comparison of tabular tax parcel data and orthophoto analysis showing additional potential small forested acres, parcels and owners in Clark County.

	Tabular tax parcel data	Orthophoto analysis	% Increase
Acres	40,543	+8,659	+21%
Parcels	1,905	+939	+49%
Owners	919	+710	+77%

King County

After comparing the digitized orthophotos with the tax parcel data for King County, an additional 84,595 acres of non-industrial private forestland comprised of parcels ranging from 5-5,000 acres were identified that did not appear in the original tax parcel data received from the assessor's office. Of those acres, the most likely small forestlands are those with the King County land use code "Vacant (single family)". The vacant single-family timbered parcels larger than five acres in size represent an additional 27,403 acres, 1,885 parcels and 1,512 owners that were not originally identified by the tax parcel data analysis.

Table 6. Comparison of tabular tax parcel data and orthophoto analysis showing additional potential small forested acres, parcels and owners in King County.

	Tabular tax parcel data	Orthophoto analysis	% Increase
Acres	30,968	+27,403	+88%
Parcels	2,255	+1,885	+84%
Owners	558	+1,512	+270%

Stevens County

Stevens County was selected for GIS analysis as it was considered to be representative of the more heavily timbered counties on the eastside of Washington, including: Pend

Oreille, Ferry and Okanogan. Stevens County, however, does not yet have a complete GIS tax parcel layer; therefore several sample areas with GIS tax parcel information were utilized comprising 169,000 acres of forestland or approximately 15% of the total forestland in the county. Using Department of Natural Resources 1995 digital ortho-rectified aerial photos, a GIS layer was created for the forested parcels in the sample areas in the county. All industrial ownerships were queried and removed from the GIS database as well as all small forestland parcels previously identified by the original tax parcel database. Removing these ownerships from the GIS database yielded an additional 7,695 acres, 992 parcels and 517 owners of small forestlands in the sample area that were not initially identified by the tabular tax parcel database. Expanding these numbers by 85% yields an approximated total of 51,300 acres, 6,613 parcels and 3,446 landowners countywide that were not originally identified by the tax parcel database.

Table 7. Comparison of tabular tax parcel data and orthophoto analysis showing additional small forested acres, parcels and owners in Stevens County.

	Tabular tax parcel data	Orthophoto analysis	% Increase
Acres	480,472	+51,300	+11%
Parcels	10,342	+6,613	+64%
Owners	4,649	+3,446	+74%

Spokane County

Spokane County was also chosen from the eastside counties as it was considered representative of the remaining counties that do not have significant amounts of forestlands. Using Department of Natural Resources 1995 digital orthophotos, a GIS layer was created for the forested parcels in the county. For this validation process, only forested parcels of 5 acres or greater were selected from the GIS layer. All industrial ownerships were queried and removed from the GIS database as well as all small forestland parcels previously identified by the original tabular tax parcel database. Removing these ownerships from the GIS database yielded an additional 62,055 acres, 6,429 parcels and 3,570 owners of small forestlands not initially identified in the tabular tax parcel database.

Table 8. Comparison of tabular tax parcel data and orthophoto analysis showing additional potential small forested acres, parcels and owners in Spokane County.

	Tabular tax parcel data	Orthophoto analysis	% Increase
Acres	55,291	+62,055	+112%
Parcels	1,813	+6,429	+354%
Owners	727	+3,570	+491%

Appendix B

Comparison of Geographic Information System (GIS) data and tabular tax parcel data when trying to answer spatially explicit questions.

The following image shows the limitations of tabular tax parcel data when trying to answer spatially explicit questions. Although tabular information is spatially explicit, it is based on legal descriptions (township, section, range), and therefore has a resolution of, at best, one-quarter mile. GIS data, however, is accurate down to approximately 15 feet depending on how the data was collected. Therefore, GIS data is much more capable of answering questions that require spatially precise information.

Figure 3. A comparison of Non-industrial private forestland statistics using geographic information system tax parcel record methods versus tabular tax parcel record methods.

Appendix C

Statewide small forest ownerships by watershed administrative unit (WAU)

(data generated from the tabular tax parcel database)

Table 9. Statewide small forest ownerships by watershed administrative unit.

WAU	WRIA	FF ACRES	WAU ACRES	PERCENT SFLO
GROUSE CREEK	COLVILLE	11,708	22,478	52%
HUCKLEBERRY CREEK	COLVILLE	25,454	49,598	51%
MAGEE CREEK	MIDDLE LK ROOSEVELT	24,266	47,322	51%
MF NEWAUKUM	UPPER CHEHALIS	13,839	28,292	49%
ECHO	COLVILLE	16,930	37,562	45%
MIDDLE COLVILLE	COLVILLE	18,575	41,619	45%
LOON-DEER LAKES	COLVILLE	22,263	50,582	44%
EAST STRANGER CRE	COLVILLE	12,706	29,341	43%
HARVEY CREEK	MIDDLE LK ROOSEVELT	18,865	45,851	41%
HAZELDELL	COWLITZ	4,506	10,972	41%
MILL CREEK	COWLITZ	11,512	28,095	41%
DEER VALLEY	PEND OREILLE	13,732	33,763	41%
LONG LAKE NORTH	LOWER SPOKANE	12,303	30,694	40%
QUILLISACUT CREEK	MIDDLE LK ROOSEVELT	9,505	23,782	40%
KELLY HILL	UPPER LK ROOSEVELT	7,481	19,121	39%
HUNTERS-ALDER	MIDDLE LK ROOSEVELT	18,641	47,824	39%
HALLER CREEK	COLVILLE	25,158	64,957	39%
OLEQUA	COWLITZ	13,507	35,481	38%
STENSGAR CREEK	COLVILLE	17,778	46,702	38%
OR-A-PAK-EN CREEK	MIDDLE LK ROOSEVELT	14,540	39,275	37%
FORD	LOWER SPOKANE	22,877	63,776	36%
SCATTER CREEK	UPPER CHEHALIS	11,930	33,928	35%

BRUCE CREEK	UPPER LK ROOSEVELT	17,879	52,739	34%
LANNIGAN SPRINGS	UPPER YAKIMA	3,258	9,933	33%
ONION CREEK	UPPER LK ROOSEVELT	15,505	47,360	33%
LACAMAS	COWLITZ	17,861	55,056	32%
LOWER NF NEWAUKUM	UPPER CHEHALIS	13,470	41,531	32%
BEAVER CREEK	LITTLE SPOKANE	15,040	46,410	32%
THOMPSON CREEK	MIDDLE SPOKANE	9,219	29,896	31%
SCAMMON-STEARNS	UPPER CHEHALIS	13,857	45,343	31%
HARMONY	COWLITZ	6,530	21,973	30%
COTTONWOOD CREEK	COLVILLE	9,245	31,939	29%
VEDDER	NOOKSACK	6,173	21,376	29%
WEST BRANCH	LITTLE SPOKANE	18,297	65,154	28%
NORTHPORT	UPPER LK ROOSEVELT	11,496	41,530	28%
COAL CREEK	GRAYS-ELOKOMAN	6,419	23,724	27%
GEORGE CREEK	MIDDLE SNAKE	5,749	21,895	26%
CAMAS VALLEY	LOWER SPOKANE	15,164	57,779	26%
CEDAR CREEK	LEWIS	9,585	36,677	26%
BLAKELY	SAN JUAN	3,461	13,274	26%
LOWER WILLAPA	WILLAPA	9,853	37,953	26%
JORDAN	STILLAGUAMISH	3,911	15,311	26%
CURTIS	UPPER CHEHALIS	11,025	44,976	25%
BLACK RIVER	UPPER CHEHALIS	16,164	66,500	24%
ROCK-JONES	UPPER CHEHALIS	6,818	28,098	24%
UPPER SOUTH FORK	UPPER CHEHALIS	5,906	25,173	23%
EBEY HILL	STILLAGUAMISH	4,344	18,588	23%
DEER CREEK	COLVILLE	6,683	28,786	23%
SCOTIA	LITTLE SPOKANE	21,112	91,623	23%
MAIN TOUTLE	COWLITZ	8,860	39,748	22%
LITTLE QUIL	QUILCENE-SNOW	6,334	28,616	22%
BLANCHARD CREEK	MIDDLE SPOKANE	9,165	41,957	22%
HUFFAKER	COWLITZ	3,721	17,471	21%
DEMING	NOOKSACK	5,882	27,663	21%
DRAGOON CREEK	LITTLE SPOKANE	13,011	61,562	21%
CURLEW CREEK	KETTLE	2,968	14,061	21%
MILLER CREEK	UPPER SKAGIT	2,139	10,195	21%
MOX CHEHALIS	LOWER CHEHALIS	4,034	19,279	21%
HEADWATERS	WILLAPA	13,147	62,909	21%
PIERRE	KETTLE	5,732	27,533	21%
TOULOU CREEK	KETTLE	10,018	48,401	21%

KOSMOS	COWLITZ	3,732	18,044	21%
LOWER KALAMA	LEWIS	9,495	46,324	20%
ABERDEEN WATERSHE	LOWER CHEHALIS	4,995	24,378	20%
DEER CREEK	LITTLE SPOKANE	9,311	45,460	20%
WOODS CREEK	SNOHOMISH	8,784	43,009	20%
LOWER COWEEMAN	COWLITZ	9,050	45,054	20%
BREMER	COWLITZ	4,345	22,001	20%
LOWER SKOKOMISH	SKOKOMISH-DOSEWALLIPS	4,092	20,747	20%

Appendix D

Small forestlands by watershed administrative unit (WAU) in each sample county

Clark County

Table 10. Small forestlands by WAU in Clark County. WAUs that are not listed have no small forest riparian ownership.

WAU	% SMALL FORESTLAND (TABULAR)	% SMALL FORESTLAND (GIS)	WAU ACRES
CANYON CREEK	2%	1%	42,851
CATHLAPOTL	6%	13%	36,677
CEDAR CREEK	52%	19%	21,377
COPPER CREEK	1%	0%	30,691
HORSESHOE FALLS	13%	16%	42,701
LACAMAS	24%	7%	14,829
LAKE MERWIN	5%	4%	34,442
LITTLE WASHOUGAL	6%	7%	22,755
MT ZION	3%	3%	21,482
ROCK CREEK	7%	7%	28,416
SILVERSTAR	1%	1%	40,447
VANCOUVER	5%	4%	125,008
WOODLAND	4%	3%	39,753
YACOLT	15%	12%	54,996
TOTAL ACRES	45,692	35,099	

King County

Table 11. Small forestland by WAU in King County. Those WAUs that are not listed have no small forest riparian ownership.

WAU	% SMALL FORESTLAND (TABULAR)	% SMALL FORESTLAND (GIS)	WAU ACRES
BARING	1.81%	1.82%	36,341
BECKLER RIVER	0.15%	0.01%	65,853
CEDAR, LOWER	1.52%	1.09%	19,526
CHERRY	4.33%	3.49%	45,157
CHESTER	0.00%	0.00%	52,064
CUMBERLAND	19.47%	12.17%	19,101
DECEPTION	0.48%	0.47%	51,911
FOSS RIVER	0.16%	0.17%	40,183
GREEN	0.00%	0.00%	23,675
GREEN, NF	4.90%	3.62%	22,602
GREEN-DUWAMISH, LOWER	2.99%	1.86%	123,693
GREENWATER	0.00%	0.00%	49,240
GRIFFIN	2.14%	1.74%	20,024
HAYSTACK	0.00%	0.00%	24,190
HOWARD HANSEN	1.10%	0.47%	46,528
LAKE SAMMAMISH	0.17%	0.03%	23,597
LAKE WASHINGTON, N	0.20%	0.12%	142,906
LAKE WASHINGTON, S	0.72%	0.62%	77,192
LANDSBURG	0.81%	0.00%	22,936
LESTER	0.00%	0.00%	32,833
LOWLAND WHITE	0.30%	0.11%	46,636
MIDDLE, LOWER	9.51%	6.79%	24,249
MIDDLE, UPPER	1.22%	0.63%	85,536
MILLER-MONEY	0.10%	0.10%	39,672
MUD MTN	1.75%	1.41%	33,822
NEWAUKUM	8.48%	4.81%	24,845
PUGET	0.02%	0.02%	109,241
PUYALLUP, LOWER	0.00%	0.00%	87,939
RAGING RIVER	3.47%	2.40%	22,460
SMAY	0.00%	0.00%	14,496
SNOQUALMIE, LOWER	9.63%	7.90%	35,125

SNOQUALMIE, NF	2.81%	2.50%	65,963
SNOQUALMIE, S	1.81%	1.47%	55,194
SUNDAY	0.00%	0.00%	15,598
TATE	10.60%	6.58%	10,694
TIGER	3.10%	2.10%	40,786
TOKUL	2.29%	0.93%	21,398
TOLT	1.91%	1.31%	63,462
VASHON IS	3.34%	3.23%	49,866
WHITE, MIDDLE	0.00%	0.00%	28,678
YOUNGS CREEK	0.00%	0.00%	18,678

Appendix E

Percent of riparian land base in small forest ownerships by watershed

Clark County

Table 12. Percent of riparian land base (100 ft. buffer) in small forest ownerships by WAU using Clark County GIS data. WAUs that are not listed have no small forest riparian ownerships.

WAU	100 FT
CANYON CREEK	1.20%
CATHLAPOTL	12.67%
CEDAR CREEK	20.03%
COPPER CREEK	0.70%
HORSESHOE FALLS	16.03%
LACAMAS	8%
LAKE MERWIN	3.81%
LITTLE WASHOUGAL	6.21%
MT ZION	3.72%
ROCK CREEK	8.54%
SILVERSTAR	1.70%
VANCOUVER	5.86%
WOODLAND	5.14%
YACOLT	10.24%

King County

Table 13. Percent of riparian land base (100 ft. buffer) in small forest ownerships by WAU using King County GIS data. Those WAUs that are not listed have no small forest riparian ownerships.

WAU	100 FT
BARING	1.16%
CEDAR, LOWER	0.22%

CHERRY	3.92%
CUMBERLAND	7.81%
DECEPTION	0.66%
GREEN, NF	1.12%
GREEN-DUWAMISH, LOWER	1.85%
GRIFFIN	2.34%
HOWARD HANSEN	0.25%
LAKE SAMMAMISH	0.14%
LAKE WASHINGTON, N	0.09%
LAKE WASHINGTON, S	0.83%
LOWLAND WHITE	0.01%
MIDDLE, LOWER	5.59%
MIDDLE, UPPER	1.16%
MILLER-MONEY	0.01%
MUD MTN	0.60%
NEWAUKUM	4.25%
RAGING RIVER	1.24%
SNOQUALMIE, LOWER	7.39%
SNOQUALMIE, NF	1.66%
SNOQUALMIE, S	1.58%
TATE	7.19%
TIGER	2.06%
TOKUL	0.86%
TOLT	1.28%
VASHON IS	7.30%

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